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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/666,648	09/19/2003	Gopal Subray Revankar	16568	8501

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EXAMINER	
BAREFORD, KATHERINE A	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 04/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/666,648	REVANKAR, GOPAL SUBRAY	
	Examiner	Art Unit	
	Katherine A. Bareford	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Claim 6 is canceled.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

The amendment of March 24, 2005 has been received and entered. The Examiner notes that claim 6 has been canceled.

Specification

1. The objection to the specification as failing to provide proper antecedent basis for the claimed subject matter of claim 4 is withdrawn due to the amendment to paragraph [0017] of the specification of March 24, 2005.

Claim Rejections - 35 USC § 112

2. The rejection of claims 1-6 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention are withdrawn due to applicant's amendments and arguments of March 24, 2005.

Claim Rejections - 35 USC § 102

3. The rejection of claim 6 under 35 U.S.C. 102(b) as being anticipated by Hodge (US 2774686) is withdrawn due to the cancellation of claim 6 on March 24, 2005.

4. The rejection of claim 6 under 35 U.S.C. 102(b) as being anticipated by Japan 2001-038791 (hereinafter '791) is withdrawn due to the cancellation of claim 6 on March 24, 2005.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japan 2001-038791 (hereinafter '791) in view of Jaeger (US 4075392) and Revankar (US 5879743).

'791 teaches a method to apply an nickel or cobalt alloy coating to a substrate which can be a cast iron part. Abstract. The cast iron part can be made from a spheroidal (or nodular) graphite cast iron. Abstract. The alloy coating can be corrosion resistant and abrasion (wear) resistant. Paragraph [0001]. The alloy coating material can be a nickel or cobalt base self fluxing alloy. Abstract. The cast iron part to be coated is decarburized before coating with the alloy. Abstract and paragraphs [0008], [0014]--[0017]. The part is decarburized to an effective depth to prevent carbon and silicon diffusion problems. Paragraphs [0009] and [0011]. The effective depth can be 0.5 to 1.5

mm. Paragraph [0011]. Then the alloy is applied to the decarburized area of the part. Abstract and paragraphs [0008] and [0017].

Claim 4: the effective depth can be about 0.5 to 1.5 mm. Paragraphs [0011] and [0015].

Claim 5: The alloy can be applied by thermal spraying, such as plasma spraying, or by HIP shaping. Abstract and paragraphs [0008] and [0017]—[0018].

'791 teaches all the features of these claims except (1) the "finely powdered" alloy and its fusion temperature, (2) the melting point of the substrate cast iron, (3) the fusing of the coating, (4) and that the decarburizing depth is such as to prevent diffusion of carbon to an extent that would lower the fusion temperature of the applied layer during fusing and causing flow of the layer, (5) the slurry coating (claim 2) and (6) the depth of claim 3.

However, Jaeger teaches coating a ferrous metal substrate with an alloy to provide a corrosion resistant coating. Column 1, lines 1-10. The substrate can be cast iron. Column 6, lines 30-40. The alloy coating is a self-fluxing alloy, which can be an alloy of nickel or cobalt containing boron, silicon, chromium and/or tungsten. Column 4, lines 1-45. The alloy coating is applied by thermal spraying. Column 5, line 60 through column 6, line 5 and column 6, lines 30-45. The coating is provided by spraying powder which would appear to be finely divided from the size ranges given. Column 5, line 60 through column 6, line 5. After the coating is applied by thermal spraying, the coating is heated to fuse the coating onto the substrate. Column 6, lines

15-20 and 35-45. This would heat the substrate as well, but not to the point of melting. Column 6, lines 15-20 and 35-45 (as the coating is shown as melting, not the substrate, which would be heated, however, from the contact with the hot alloy coating, at the least).

Furthermore, Revankar teaches that it is known to apply a wear resistant alloy coating to a cast iron part by a method using a slurry. Column 1, lines 60-68 and column 5, lines 25-40. A slurry is formed of "finely divided" wear resistant alloy powders, and this slurry is applied to a substrate. Column 1, lines 60-68. Then the applied coating is fused to the substrate by heating the substrate and coating to a temperature below the melting point of the substrate but sufficient to cause the alloy to fuse. Column 8, lines 35-40 and column 9, lines 25-30. The alloy can be a nickel or cobalt alloy containing materials such as boron, silicon, chromium and tungsten. Column 6, line 45 through column 7, line 10. The fusion temperature of these alloys is desirably 900 to 1200 degrees C, such as about 1100 degrees C or less. Column 6, lines 45-60.

It is the Examiner's position that it is well known in the art for nodular graphite cast iron to have a melting temperature of, for example, 1160 degrees C. If applicant disagrees, he should so state on the record.

It would have been obvious to one of ordinary skill in the art at the time the invention was made (1) to modify '791 to provide the alloy to be sprayed in the form of a "finely divided" powder of a self fluxing nickel or cobalt alloy as suggested by Jaeger

in order to provide a desirable thermal spraying, because '791 teaches thermal spraying a self fluxing alloy of nickel or cobalt onto a cast iron substrate, and Jaeger teaches that when thermally spraying an alloy of nickel or cobalt on a cast iron substrate, it is well known to be desirable to provide the coating material to be sprayed in the form of a finely divided powder. It would further have been obvious to modify '791 in view of Jaeger to use material of the claimed fusion temperature of between 1085 and 1100 degrees C as suggested by Revankar with an expectation of providing a desirable coating, because '791 in view of Jaeger teaches that nickel or cobalt alloys containing boron, silicon, chromium, etc. can be used (note the materials of Jaeger) and Revankar teaches that alloys of such materials desirably have a fusion temperature of between 900 and 1200 degrees C, such as about 1100 degrees C or less (with 1100 degrees C being in the claimed range). (2) It would further have been obvious to modify '791 in view of Jaeger and Revankar to provide that the cast iron substrate has a melting point of 1160 degrees C with an expectation of providing a desirable substrate surface, because such a melting point is a well known conventional melting point for nodular graphite cast iron as taught by '791. (3) Furthermore, it would have been obvious to modify '791 to fuse the applied coating to the cast iron with heat as suggested by Jaeger and Revankar in order to provide a desirably adhered coating, because '791 teaches thermal spraying an alloy coating onto a cast iron substrate, and Jaeger teaches that when thermal spraying an alloy coating onto a cast iron substrate, it is desirable to further fuse the coating to the substrate with heat and Revankar also teaches fusing an applied coating. (4) It

would further have been inherent that when performing the decarburizing and coating of '791 in view of Jaeger and Revankar, the decarburizing would be to an effective depth to prevent diffusion of carbon into a layer of said coating in contact with the cast iron to the extent that the diffusion of carbon would lower the fusion temperature of the layer causing the layer to flow (as in part (c) of claim 1), because '791 teaches decarburizing to prevent carbon diffusing from the base material to the surface coating, and that such a depth is desirably 0.5 mm to 1.5 mm, in the range of the depth of claim 4, which is provided as an effective depth. (5) It would further have been obvious to one of ordinary skill in the art at the time the invention was made to modify '791 in view of Jaeger to use a slurry method of coating as suggested by Revankar in order to provide a desirable coated product, because '791 teaches thermal spraying an alloy onto a cast iron substrate and that other methods such as HIP (hot isostatic pressing) can also be used to apply the alloy and Jaeger indicates the desire to fuse even thermal sprayed applied coatings, and Revenkar teaches that a desirable method for applying a wear resistant alloy onto a cast iron substrate is to apply a slurry followed by fusing. (6) Furthermore, it would have been obvious to modify '791 in view of Jaeger and Revenkar to perform routine experimentation to optimize the depth of decarburization based on the article to be coated and the coating to be applied, as '791 provides desirable decarburization depths for coatings to be applied to barrels of extruders is to be in the 0.5 mm to 1.5 mm range, but as indicated by Jaeger and Revenkar, cast iron articles can also be used for other purposes, with other thicknesses of coating and '791

also desires to prevent carbon diffusion into the coating, which would prevent the lowering of fusion temperature and flow of the coating during fusing.

7. Fujiwar et al (US 5690756) teaches that nodular graphite cast iron can have a known melting point of 1160 degrees C. See column 8, lines 55-60.

Response to Arguments

8. Applicant's arguments filed March 24, 2005 have been fully considered but they are not persuasive.

As to the 35 USC 103 rejection of claims 1-5, applicant argues that claim 1 requires that the cast iron part be decarburized to a depth sufficient for preventing the boundary layer of the wear resistant coating from having its melting temperature lowered to the extent that the layer flows during the fusing of the coating onto the cast iron part. Applicant argues that it is the discovery of this problem caused by diffusion that is the crux of applicant's invention. Applicant further argues, that when coating the same cast iron part without decarburization, adherence of the coating to the part is very good and no cracks or inclusions are present in the coating, and thus one would not have looked to the teachings of '791 or Jaeger to decarburize the cast iron part to overcome the melting problem of applicant.

The Examiner has reviewed these arguments, however, the rejection is maintained. As shown in the rejection above, due to the amendments to the claims, the

rejection further includes the reference to Revankar. It is the Examiner's position that as discussed in the rejection above, when combining '791 with Jaeger and Revankar the suggestion is to decarburize the surface, desirably to a depth of 0.5 mm or more, prior to the application of a nickel/cobalt base coating to prevent cracking problems, thus providing a decarburizing depth in the range of applicant's. As to the argument by applicant that when coating the cast iron without decarburization, adherence of the coating to the part is very good and no cracks or inclusions are present in the coating, and thus one would not have looked to the teachings of '791 or Jaeger to decarburize the cast iron part to overcome the melting problem of applicant, and that applicant has discovered a different coating problem that is solved by the specific decarburization step, the Examiner has reviewed this argument. However, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). While applicant states that no problem cracks or inclusion occurs when coating the cast iron part without decarburization, '791 indicates that this is a recognized problem, and that one of ordinary skill in the art would desire to prevent this problem from occurring.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KATHERINE BAREFORD
PRIMARY EXAMINER